PUBLIC INTEREST RESEARCH DOCUMENT

India's E20 Ethanol Policy:
Food Security, Water Depletion, Agricultural Strain & Political Economy

A comprehensive, evidence-based investigation for public awareness

All data sourced from public records, government disclosures, and peer-reviewed sources

April 2026 | Prepared for Public Benefit

Key Themes:

Food vs. Fuel · Groundwater Depletion · Consumer Nutrition · Agricultural Strain
Procurement Failures · Legislative Gaps · Political Economy of Ethanol

Abstract

India's Ethanol Blended Petrol (EBP) programme achieved its 20 percent blending milestone in November 2025 — a technical triumph celebrated by policymakers as a landmark in energy security. From April 1, 2026, E20 fuel is mandatory nationwide. Yet behind this achievement lies a deeply troubling set of costs, borne not by the industries that profited from the programme, but by ordinary citizens: the farmer whose groundwater is depleting, the poultry worker whose feed costs have doubled, the urban family paying more for sugar and eggs, and the taxpayer whose strategic food reserve is being converted into fuel.

This document is a comprehensive public interest investigation. It traces every major dimension of the E20 programme's real-world impact: the food security consequences across four FAO pillars; the crop-by-crop diversion and its import-export reversal; the full lifecycle of water consumption from sugarcane field to distillery outlet; the correlation between ethanol-producing geographies and India's most critically stressed aquifer zones; the structural failures in procurement and farmer protection; the legislative vacuum that allowed all of this to occur without accountability; and the political economy — documented through public records, Supreme Court-mandated electoral bond disclosures, and decades of academic literature — that explains why the programme was designed to benefit concentrated industrial capital rather than the 1.4 billion people in whose name it was undertaken.

The central finding of this document is this: India's E20 programme, as currently structured, is a food security risk, a water security threat, and a governance failure dressed in the language of clean energy. Its genuine benefits — foreign exchange savings, rural income transfers, and emissions reduction — are real but concentrated and overstated. Its costs are diffuse, uncompensated, and borne disproportionately by the most food-insecure segments of Indian society. The path to a genuinely sustainable biofuel future exists, but it requires dismantling the political architecture that has captured this programme, replacing food-crop feedstocks with second-generation cellulosic ethanol, and enacting legislation that puts food and water security — not blending targets — at the centre of policy.

1. Programme Background and Policy Architecture

1.1 Origins and Trajectory

The Ethanol Blended Petrol Programme was launched in India in 2003 with a modest goal: blend domestically produced ethanol with petrol to reduce crude oil imports. For the first decade, progress was negligible, with blending rates stagnating below 2 percent due to feedstock constraints, state excise barriers, and lack of pricing incentives.

The programme's acceleration began after 2014 under the Narendra Modi-led BJP government. A series of interventions — the National Policy on Biofuels (NPB) in 2018, administered pricing for ethanol procurement by Oil Marketing Companies (OMCs), GST reduction from 18 to 5 percent on EBP ethanol, and six rounds of Ethanol Interest Subvention Schemes (EISS) from 2018 to 2022 — fundamentally restructured the programme. In 2021, the inter-ministerial roadmap advanced the E20 target from 2030 to 2025–26, and critically, reversed the earlier commitment to non-food second-generation feedstocks in favour of sugarcane, maize, and FCI grain.

The blending rate trajectory is documented in Table 1 below:

ESY / Year	Blending %	Volume (Cr L)	Key Milestone	Policy Event
2013–14	1.53%	~38	Programme baseline	EBP Programme active
2018–19	5.00%	~150	NPB 2018 notified	E20 target set for 2030
2020–21	8.17%	~302	Roadmap released	EISS ₹626M approved
2021–22	10.17%	~411	E10 achieved (5 mo early)	Food-crop feedstock pivot
2022–23	12.06%	~500	Sugar exports restricted	NPB amended, E20 to 2025
2023–24	14.60%	~545	India: net maize importer	Maize feedstock surges
2024–25	17.98%*	~730	5.2 MT FCI rice allocated	499 distilleries operational
Nov 2025	**20%+ ✓**	~900+	E20 mandate Apr 2026	E22/E27 under discussion

*Sources: PIB, MoPNG, NITI Aayog Roadmap 2020–25, FAS USDA India Biofuels Annual 2024. *As of 28 February 2025.*

1.2 The 2021 Feedstock Pivot — The Pivotal Policy Decision

The single most consequential decision in the programme's history occurred quietly within the 2021 inter-ministerial roadmap: the abandonment of second-generation (2G), non-food cellulosic ethanol as the primary scaling pathway. The 2018 NPB had explicitly prioritised agri-waste, rice straw,

bagasse, and municipal solid waste as the preferred feedstocks for scale. The 2021 roadmap reversed this, opening sugarcane juice, B-heavy molasses, maize, and FCI surplus grain as primary feedstocks.

The significance of this reversal cannot be overstated. Second-generation ethanol, produced from crop residues and waste, does not compete with food supply, does not require additional water-intensive crop cultivation, and has a significantly better carbon lifecycle profile. First-generation ethanol from food crops — the pathway actually taken — does all three things inversely. The reversal therefore encoded, into policy, every food security, water, and equity problem this document identifies.

WHY?	The 2G pathway would have benefited farmers broadly through paddy straw and bagasse utilisation. The 1G food-crop pathway benefited the existing large sugar mill and grain distillery complexes that already had the capital, the licenses, and the political connections to expand rapidly under subsidised interest schemes. The beneficiary class of the 2021 pivot is not the same as its stated beneficiary — the Indian farmer.

2. Food Security: The Four Pillars Under Strain

2.1 India's Food Security Baseline — Why This Matters

Before evaluating the ethanol programme's food security impact, one must understand the fragility of India's nutritional baseline. India ranked 105th out of 127 countries in the Global Hunger Index 2023. Despite being the world's largest grain producer, the country faces a persistent protein deficiency gap — particularly for low-income households who cannot afford meat, fish, or dairy. For these hundreds of millions, eggs and poultry represent the primary affordable animal protein source. Pulses are the primary plant protein. Both, as this document demonstrates, have been materially affected by the ethanol programme.

The FAO defines food security along four pillars — Availability, Access, Utilisation, and Stability. The E20 programme has stressed all four, though unevenly:

- AVAILABILITY: Reduced through crop diversion — less sugar, maize, and rice available for human consumption chains;
- ACCESS: Compromised through price transmission — higher sugar, egg, and poultry prices reduce effective food access for low-income households;
- UTILISATION: Threatened through protein access deterioration — the maize-poultry chain disruption directly affects nutritional quality of affordable food;
- STABILITY: Undermined through strategic reserve drawdown — converting FCI buffer stocks to fuel reduces the emergency food cushion for drought and flood years.

KEY STAT	India spent 50+ years building the FCI buffer stock system after the 1943 Bengal Famine. That system was designed as a food-first strategic reserve. In 2024–25, 5.2 million tonnes of FCI rice — enough to feed approximately 87 million people for a year at 5 kg/month — was approved for ethanol production.

2.2 Crop-by-Crop Food Security Analysis

Table 2 below provides a structured assessment of the ethanol programme's impact on each major affected crop:

Crop	Role in Food Security	Ethanol Diversion	Export Impact	Price Effect	Risk Level
Sugarcane / Sugar	Caloric staple (tea, food processing)	Cane juice & B-molasses since 2018	Restricted since Jun 2022; zero export 2023–24	Prices hit 11-yr peak mid-2025	HIGH
Maize (Corn)	Direct food (NE India); poultry & livestock	0 in ESY 21-22 → 2.86 BL in ESY 23-24 (42% of total ethanol)	Net exporter (2–4 MT/yr) → net importer (2024)	Mandi prices surged; poultry feed crisis	CRITICAL

Crop	Role in Food Security	Ethanol Diversion	Export Impact	Price Effect	Risk Level
	feed (60–70% of feed cost)				
Rice	Primary staple for 800M+ Indians	5.2 MT FCI rice allocated 2024-25; 470 L ethanol per tonne	Export bans on broken rice; broader rice bans 2023	Stable but strategic reserve risk elevated	**MODERATE-HIGH**
Wheat	Second staple; primary protein source (chapati)	Indirect: MSP policy & acreage competition	Export ban since 2022; govt stocks at 16-yr low	Wheat procurement below comfort level	**MODERATE**
Pulses	Primary protein for 70% vegetarian population	Indirect: land competition from cane/maize	Imports surging to compensate	Chronic price instability	**MODERATE**

Sources: Down To Earth (Maize Dilemma, June 2025); FAS USDA Biofuels Annual 2024; FAS USDA Sugar Semi-Annual 2024; MoPNG; DFPD.

2.2.1 Sugarcane and Sugar

Sugar is not a luxury commodity for India's poor — it is a caloric staple embedded in tea, street food, processed food, and the everyday diet of hundreds of millions. The decision to channel sugarcane juice and B-heavy molasses into ethanol production has created a sustained competition between sugar for plates and sugar for petrol tanks.

The consequences became visible in the export data: India went from exporting 11 million tonnes of sugar in 2021–22 to zero exports in 2023–24. Global sugar prices surged as a result — directly impacting food-import-dependent nations in South Asia and Africa that relied on Indian supply. Domestic sugar prices reached an 11-year peak by mid-April 2025, as confirmed by the FAS USDA Sugar Annual 2025. To mitigate inflationary pressure in 2023–24, the government itself was forced to cap the use of sugarcane and its derivatives for ethanol production at 2.37 million metric tonnes — an implicit acknowledgement that unconstrained diversion creates domestic food price crises.

Sugar Season	Export Policy	Production (MT)	Exports (MT)	Policy Driver
2020–21	Unrestricted (free export)	~31 MMT	~7 MMT	Surplus season
2021–22	Partially free, then restricted from Jun 2022	~36 MMT	~11 MMT	Record surplus; export cap imposed

Sugar Season	Export Policy	Production (MT)	Exports (MT)	Policy Driver
2022–23	RESTRICTED — special permission required (Jun 2022 onward)	~32 MMT	~6 MMT	Domestic prices rising; ethanol diversion
2023–24	**ZERO EXPORT — ban extended indefinitely (Oct 2023)**	~29 MMT (drought + pest)	**~0 MMT**	Production shortfall + ethanol priority
2024–25	Partial — 9 lakh MT allowed vs 10 MT permitted	~28–30 MMT (est)	~0.9 MT	E20 ethanol volumes prioritised

Sources: FAS USDA Sugar Annual 2025, Sugar Semi-Annual 2024; ChiniMandi; USDA GAIN India 2024; DGFT notifications.

2.2.2 Maize — The Most Acute Food Security Failure

The maize story is the starkest evidence of the E20 programme's food security cost, and the most thoroughly documented.

Until Ethanol Supply Year 2021–22, maize was not used as an ethanol feedstock at all. The 2021 roadmap's expansion of permitted feedstocks opened the door. The result was one of the most rapid commodity supply reversals in India's modern agricultural history:

Period	Ethanol from Maize	Maize Exports	Maize Imports	Trade Status
ESY 2021–22	NIL (no maize feedstock)	1.8–4 MT/yr (normal)	~5,000 MT (negligible)	NET EXPORTER — Asia's largest
ESY 2022–23	315 million litres	Declining sharply	Rising	Transitioning
ESY 2023–24	2.86 billion litres (42% of total ethanol)	0.45 MT (down 77%)	1 MT (record) from Myanmar, Ukraine, S.Africa	**NET IMPORTER — First time in decades**
H1 CY2024	Continued surge; 3.5 MT corn → 1.35 BL ethanol	241,889 MT (down 87% YoY)	531,703 MT (vs 4,981 MT prior yr)	**Structural net importer projected permanently**

Sources: Business Standard (Sept 2024 — 'Ethanol push turns India into corn importer'); Down To Earth (June 2025 — 'Lost in Maize'); APEDA; Drishti IAS; Maize Outlook PJTAU Oct 2024; FAS USDA Grain & Feed Annual 2025.

The human cost of this pivot was felt immediately and directly by India's poultry sector. Maize accounts for 60–70 percent of poultry feed cost. When ethanol distilleries began absorbing maize in unprecedented volumes, poultry producers faced a domestic corn shortage of 5 million tonnes in 2024, according to the All India Poultry Breeders Association. Corn prices surged across mandis. The Poultry Federation of India petitioned the government for duty-free maize imports. Several producers were pushed into losses.

NUTRITIONAL IMPACT	Eggs are India's cheapest source of animal protein — critical for child nutrition, pregnant women, and the low-income elderly. When maize prices surge, egg prices follow within 6–8 weeks. The households least able to absorb these price increases are the ones most dependent on eggs as protein. The E20 programme has effectively taxed the nutritional baseline of India's most vulnerable citizens.

2.2.3 Rice and the FCI Buffer Stock Question

The government's decision to release FCI rice for ethanol production has been justified on the grounds that FCI holds surplus stocks beyond its operational requirements. This justification deserves scrutiny on three grounds.

First, the designation of grain as 'surplus' is a static assessment made in good harvest years. India's buffer stock norms were calibrated for a climate-stable world. As monsoon variability increases under climate change — with El Niño episodes causing documented production shortfalls in 2023–24 — what appears to be surplus in one year becomes deficit the next. The 2023–24 shortfall in sugarcane, partly caused by late rainfall and pest infestation, is a warning the government has not adequately incorporated into its feedstock decision-making.

Second, as researchers at Ideas for India have documented, the rice being diverted may not be unfit for human consumption. Surplus food grain is a strategic asset: it can be used for fortified grain initiatives, school meals, disaster relief, and urban nutrition schemes under the Integrated Management Public Distribution System (IMPDS). Converting it to ethanol forecloses these alternatives permanently.

Third, and most significantly, rice is among the most water-intensive crops on earth, consuming 2,500–5,000 litres of water per kilogram produced. Using FCI rice — grown in Punjab and Haryana on rapidly depleting aquifers — as ethanol feedstock is effectively converting groundwater into fuel at one of the most unfavourable conversion ratios possible. With a yield of 470 litres of ethanol per tonne of rice, the 5.2 million tonnes allocated in 2024–25 required approximately 13–26 billion litres of water to grow. This water will not be recharged.

THE FCI PARADOX	The government lowered the reserve price of FCI rice for distilleries to ₹22,500/MT in January 2025 — below the price offered to industrial buyers — to incentivise distillery uptake. Strategic food grain was being made artificially cheap for fuel production. The same government that restricts rice exports to protect domestic food security is simultaneously subsidising the conversion of that rice into fuel.

3. Import-Export Reversal: How India Became a Food Importer to Feed a Fuel Programme

3.1 The Structural Trade Shift

India's agricultural trade position has undergone a structural deterioration during the E20 programme's intensive scaling phase (2021–2025). The country has moved from being a net exporter of multiple agricultural commodities to restricting exports, imposing bans, and in the case of maize, becoming a net importer. This is not an incidental consequence of weather; it is a policy-driven reallocation of agricultural output from food chains to fuel chains.

3.2 Sugar: From Global Export Leader to Zero-Export Nation

India has historically been one of the world's top two sugar exporters, competing with Brazil for global market share. Its sugar exports to Bangladesh, Indonesia, Sudan, UAE, Somalia, and other nations served as a stabilising force in global sugar supply. The EBP programme's scaling — specifically the decision to use sugarcane juice and B-heavy molasses rather than only C-heavy molasses — began to create a structural tension between export capacity and ethanol production volumes.

The export ban sequence (detailed in Table 4, Section 2.2.1 above) had direct consequences for importing nations. When India imposed its initial export restriction in June 2022, global sugar prices surged — as international markets reacted to the withdrawal of supply from the world's second-largest exporter. Bangladesh, one of India's largest sugar customers, faced import cost increases. Sudan, one of the poorest nations in the world, which relies on Indian sugar exports, faced supply disruptions. The ripple effects of India's domestic ethanol policy were felt in food-insecure populations thousands of kilometres away.

3.3 Maize: Asia's Largest Exporter Becomes a Net Importer

The maize trade reversal is the most dramatic and best-documented export collapse in this programme's history. Prior to 2022, India exported 2–4 million metric tonnes of maize annually, primarily to Vietnam, Bangladesh, Nepal, Malaysia, and Thailand. These countries had built supply chain dependencies on Indian maize.

In the first half of calendar year 2024, India's corn imports surged to 531,703 tonnes — from just 4,981 tonnes in the same period a year earlier — while exports fell 87 percent from 1.8 million tonnes to 241,889 tonnes. India was importing maize from Myanmar, Ukraine, and South Africa — countries that grow non-GM corn — to compensate for the domestic corn that had been diverted to ethanol distilleries. India was, in effect, importing food to replace what it was converting to fuel.

The global market impact was also significant: India's absence as an exporter tightened Asian corn supply, supported prices that were already near four-year lows globally, and disrupted the food-feed supply chains of several smaller Asian economies. The NITI Aayog has projected that India will

remain a permanent net importer of maize unless domestic production is substantially expanded — a process that requires years and additional water, land, and input resources.

3.4 Wheat and Pulses: Indirect Export Suppression

Wheat exports were banned in May 2022 amid domestic supply concerns — with government wheat procurement stocks falling below comfort levels. India's F&B exports fell 10.1 percent in 2023–24, with sugar exports down 51 percent and wheat exports down 96.3 percent year-on-year. While not all of this decline is attributable to ethanol, the crop diversion dynamics — particularly the acreage competition from incentivised sugarcane and maize cultivation — contributed to the broader agricultural trade deterioration.

Pulse cultivation, which is India's most nutritionally critical and ecologically fragile food crop, requires no irrigation in most regions, and competes directly with sugarcane and maize for farmland in Maharashtra, Karnataka, and UP. The ethanol incentive pricing for cane and grain has effectively reduced the economic attractiveness of pulse cultivation for farmers with access to irrigation — precisely the farmers whose acreage decisions most significantly affect national pulse supply.

4. Water: A Full Lifecycle Analysis of Ethanol's Hidden Cost

4.1 Why Water Is the Programme's Most Acute Long-Term Risk

India has 18 percent of the world's population but only 4 percent of global freshwater resources, making it one of the most water-stressed nations on earth by per-capita availability. The country extracts 241.34 billion cubic metres of groundwater annually — approximately 25 percent of the world's total groundwater extraction. Against this backdrop, the decision to concentrate ethanol production in the most water-intensive crop sectors, grown in the most groundwater-depleted states, represents a systemic compounding of an already critical national risk.

4.2 Stage-by-Stage Water Consumption

The following table documents water consumption at every stage of the ethanol production and use chain:

Stage	Process	Water Consumed	Primary Concern	Affected Region
Crop Cultivation (Sugarcane)	Irrigation — perennial 12–18 month crop	1,500–2,000 L/kg sugar; 2,500–3,500 L/L ethanol	Groundwater mining in stress zones	UP, Maharashtra, Karnataka
Crop Cultivation (Maize)	Irrigation; shifting to semi-arid zones	900–1,200 L/kg; rising as irrigated area expands	New aquifer stress in dry belts	MP, Rajasthan, Telangana
Crop Cultivation (Rice-FCI)	Paddy flooding; Green Revolution legacy	2,500–5,000 L/kg — highest of all cereals	Converting food water into fuel	Punjab, Haryana (critically stressed)
Distillery Processing	Fermentation, distillation, cooling	8–15 L per litre of ethanol produced	Industrial effluent (spent wash), river pollution	All distillery clusters
Spent Wash Disposal	High-BOD effluent from fermentation	8–10 L wastewater per L ethanol	Soil and groundwater contamination	UP, Maharashtra (documented cases)
Transport & Blending	Tank washing, depot operations	Minor but non-zero	Phase separation risk in humid regions	All blending depots

Sources: IWA Publishing — 'Navigating India's Groundwater Crisis' (2024); Ideas for India — 'Why India's Plan to Sell Rice for Ethanol Undermines Food and Water Security'; SPRF India; Agricultural Water Management (Dang et al., 2022); CGWB 2023 Report.

4.3 Groundwater Table Data: The Geographic Correlation

The central analytical finding of this section is a damning geographic correlation: India's primary ethanol-producing states are also India's most groundwater-stressed states. This is not coincidence

— sugarcane grows where groundwater is accessible, distilleries locate where cane is grown, and the resulting water extraction adds to the depletion pressure already created by agricultural irrigation.

State	Overexploited Blocks	Depletion Rate	Ethanol Crop Link	CGWB Finding
Punjab	>80% of 153 assessed blocks	1.0–1.2 m/yr decline in critical districts	Paddy (rice-ethanol); sugarcane	Punjab & Haryana lost 64.6 BCM groundwater over 17 years; 164 units extracted per 100 recharged
Haryana	>75% of blocks critical/overexploited	136 units extracted per 100 recharged	Paddy-wheat monoculture	5-decade decline; solar pumps accelerating extraction
Uttar Pradesh (West)	11%+ overexploited as of 2017; worsening	Accelerating post-2018 distillery expansion	Sugarcane belt — Meerut, Muzaffarnagar, Shamli, Lakhimpur Kheri	Intensive cane + distillery cluster: compounding extraction; groundwater primary drinking source for millions
Maharashtra (Marathwada)	Multiple critically stressed districts	Perennial drought conditions; El Niño episodes	Sugarcane — 670 mm average water depth per crop cycle	Sugarcane cultivation expanding despite drought advisory; political economy prevents correction
Rajasthan	>87% of blocks unsafe	149 units extracted per 100 recharged — worst proportionally	Maize expansion into semi-arid belts	203/249 blocks critical or overexploited (2022); solar pump revolution worsening aquifer stress

Sources: CGWB National Compilation on Dynamic Ground Water Resources of India 2023 (published June 2024); SANDRP Groundwater 2024 Report; JICE IAS Groundwater Crisis 2025; India Today DIU Data Analysis Feb 2024; IWA Publishing Water Policy Journal Aug 2024.

4.3.1 Punjab and Haryana: The Rice-Ethanol Double Extraction

Punjab and Haryana represent the most acute case of compounded water stress in this programme. These states have been at the epicentre of India's groundwater crisis since the Green Revolution of the 1960s introduced paddy cultivation into a semi-arid region ill-suited for it. Over 17 years, Punjab and Haryana collectively lost 64.6 BCM of groundwater — an extraordinary depletion of a non-renewable resource. More than 80 percent of Punjab's assessed blocks are now overexploited, with the state extracting 164 units of groundwater for every 100 units recharged.

Into this already critical situation, the EBP programme introduced a new demand: 5.2 million tonnes of FCI rice — grown largely on Punjab and Haryana aquifers — allocated for ethanol production in 2024–25. The water consumed in growing this rice, at a conservative 3,000 litres per kilogram,

amounts to approximately 15.6 billion litres. This water came from aquifers already declining at 0.5–1.2 metres per year in critical districts. It will not be replenished on any human timescale.

4.3.2 Uttar Pradesh: Sugarcane, Distilleries, and Drinking Water

Western Uttar Pradesh — the Ganga-Yamuna Doab — is both India's largest sugarcane producing belt and the location of the highest concentration of ethanol distilleries. Bajaj Hindusthan Sugar's 14 mills and 6 distilleries are all located in UP's sugarcane districts. Triveni Engineering's 7 mills and 7 co-located distilleries are similarly concentrated. The UP Distillers Association counts 85 operational distilleries in the state with 20 more coming up.

Groundwater is the primary drinking water source for the majority of households in this region. The overexploitation of aquifers for sugarcane irrigation — now reinforced by distillery process water demand — directly threatens drinking water access. A 2017 assessment classified 11 percent of UP's blocks as overexploited, a figure that has not improved with the doubling of distillery capacity since 2018.

4.3.3 Maharashtra: Drought-Zone Sugarcane and the Political Immunity of the Sugar Industry

Maharashtra presents the most politically charged water story of the programme. Marathwada — the drought-prone region of central Maharashtra — has been subject to periodic government advisories against sugarcane cultivation due to its extreme water stress. Yet sugarcane cultivation in the region has persisted and expanded, protected by the political economy of Maharashtra's cooperative sugar mill sector.

As The Wire's investigation documented in April 2025, agriculture and water experts identify the push to increase ethanol production — with its focus on distillery expansion — as a key driver reinforcing sugarcane cultivation in water-stressed zones. Free electricity for irrigation, ethanol price incentives, and state loan guarantees to cooperative mills have made sugarcane cultivation economically dominant even in regions where it is ecologically destructive.

4.4 The Distillery Effluent Problem

Beyond field-level water consumption, the distillery processing stage generates a highly polluting waste stream: spent wash. A typical 1G distillery produces 8–10 litres of spent wash per litre of ethanol — a liquid with extremely high biological oxygen demand (BOD), acidic pH, and high organic content. Improperly treated, it contaminates soil and groundwater.

Sugar mills and distilleries are classified among the 17 most polluting industries by the Central Pollution Control Board. While Zero Liquid Discharge (ZLD) norms are mandated under the EISS — distilleries receiving subsidies must implement ZLD — compliance monitoring is state-level and inconsistent. River pollution incidents near distillery clusters in UP and Maharashtra are documented in environmental monitoring reports, though systematic public disclosure is limited.

With 499 distilleries operational as of June 2025, and 38 more under EISS subsidy set to be commissioned, the aggregate spent wash burden on India's water bodies is increasing rapidly. The absence of a mandatory, nationally monitored water use and effluent compliance registry for distilleries receiving public subsidies is a governance failure of the first order.

5. Shifting Agriculture Practices and Human Impact

5.1 How Ethanol Incentives Are Reshaping What India Grows

Agricultural crop choice is responsive to pricing signals. The EBP programme has created powerful price incentives for sugarcane, maize, and paddy — the three most water-intensive major crops — in a country already facing groundwater depletion. The consequences for cropping patterns are measurable and troubling.

India's Green Revolution legacy already locked Punjab and Haryana into water-intensive rice-wheat monoculture. Decades of policy work attempted to shift these states toward less water-intensive alternatives: millets, oilseeds, pulses. The ethanol programme's grain procurement — particularly the FCI rice allocation — has re-incentivised paddy in exactly the states where it causes the most aquifer damage.

In Maharashtra and Karnataka, the ethanol price premium for sugarcane juice and B-heavy molasses has reinforced cane cultivation in drought-prone areas despite state-level water conservation frameworks. When a crop offers guaranteed OMC procurement at a government-administered price, farmers with irrigation access respond predictably: they plant it, regardless of ecological advisory.

5.2 Who Wins and Who Loses: The Asymmetric Human Impact

The programme's human impact is not uniform. It produces winners and losers, and they are not the same people:

5.2.1 Large Sugar Mill Owners and Distillery Operators

The primary financial beneficiaries of the programme are the large sugar mill-distillery complexes. OMCs disbursed ₹1.96 lakh crore to distilleries over the programme's decade — a transfer of public money to a concentrated industrial sector. The EISS provided ₹626 million in initial subsidy approvals, with subsequent rounds adding more. The 10 largest ethanol-producing companies — Shree Renuka Sugars, Bajaj Hindusthan, Triveni Engineering, Balrampur Chini, Dhampur Sugar, Dalmia Bharat Sugar, Dwarikesh Sugar, EID Parry, Piccadily Agro — are all listed companies with documented market capitalisations, institutional shareholders, and in several cases, promoter holdings pledged to debt.

5.2.2 Sugarcane Farmers in Production Zones — Partial Beneficiaries

The programme has genuinely transferred income to sugarcane farmers, with ₹1.18 lakh crore reported as paid to farmers over the decade. This is a real benefit, concentrated in Uttar Pradesh, Maharashtra, and Karnataka. However, the distributional analysis matters: the majority of this income accrues to cane-growing farmers who are also the primary water users. The ethanol programme has increased their income while accelerating the groundwater depletion that will make their land less productive in future decades. The benefit is present-tense; the cost is inter-generational.

Additionally, the payment pass-through from mills to farmers is not guaranteed. Maharashtra's cooperative mills have historically accumulated cane payment arrears — the chronic problem the ethanol programme was marketed as solving. While arrears have reduced, they have not been eliminated, and the structural relationship between mill and farmer remains asymmetric: the mill controls the cane purchase price negotiation, the mill decides the ethanol-to-sugar diversion ratio, and the mill captures the OMC payment first.

5.2.3 Smallholder Farmers — Largely Excluded

Smallholder farmers — those with under 2 hectares — disproportionately lack the deep bore wells required to sustain sugarcane cultivation through dry periods. They are exposed to the water depletion externality — shallower wells dry up faster, pumping costs increase, crop failure risk rises — without proportionate income compensation. The ethanol pricing premium flows primarily to farmers who can sustain continuous cane cultivation, which correlates with land size and capital access.

5.2.4 Agricultural Labourers — No Benefit, Maximum Exposure

Agricultural labourers — tens of millions of households with no land — participate in neither the cane income nor the distillery employment to any significant degree. They are fully exposed to the food price consequences: higher sugar, higher egg prices, costlier poultry. Their expenditure share on food — often 55–65 percent of household income — means that even modest food price inflation is materially damaging to their nutritional intake.

5.2.5 Urban Low-Income Households

India's urban poor — the daily wage worker, the domestic worker, the informal economy participant — receives no ethanol income, has no cane land, and faces the full food price transmission of the programme. A family spending ₹8,000 per month on food, with sugar, eggs, and poultry absorbing 25–30 percent of that budget, has experienced real income erosion through the E20 scaling period that no government data set has systematically measured or compensated.

5.2.6 The Northeast and Tribal Communities

India's northeastern states — where maize is a dietary staple, not merely a feed crop — have experienced the sharpest nutritional impact from the maize price surge. These communities, many of them tribal, consume maize directly as a food grain. When maize prices surge because ethanol distilleries in UP and Maharashtra are absorbing national supply, these communities pay higher food prices for a commodity that is fundamental to their diet. They have received no consultation, no compensation, and no supply protection under the programme. Several northeastern states also reported inconsistent E20 supply logistics as the mandate rollout proceeded — they are penalised as fuel consumers without sharing in the agricultural income.

6. Procurement Procedures: Structural Failures and Design Flaws

6.1 The OMC Procurement Architecture

Ethanol for blending is procured by Oil Marketing Companies — Indian Oil Corporation (IOC), Bharat Petroleum Corporation Limited (BPCL), and Hindustan Petroleum Corporation Limited (HPCL) — through government-notified tenders at administered prices set annually by the Cabinet Committee on Economic Affairs (CCEA). Prices are differentiated by feedstock: C-heavy molasses, B-heavy molasses, sugarcane juice, damaged grain, rice (from FCI), and maize attract different procurement rates.

Long-Term Offtake Agreements (LTOAs) provide distilleries with 5–15 year demand certainty from OMCs — a structural feature that was designed to encourage capital investment in new capacity, but that simultaneously locks in 1G feedstock pathways for the duration of the agreements and makes the transition to 2G ethanol more commercially difficult.

6.2 What the Procurement System Does Not Do

The procurement mechanism has several critical design gaps that have been consistently overlooked in official communications about the programme's success:

- It sets no statutory cap on the proportion of any crop that may be diverted to ethanol production. The government has informally capped sugarcane diversion in shortage years, but this has been done through executive order — not by law — and is reversible at any time.
- It imposes no water-use compliance requirements as a condition of procurement eligibility. A distillery operating in a CGWB-classified Overexploited groundwater zone faces no penalty, exclusion, or reduced procurement allocation.
- It does not mandate the direct payment of ethanol proceeds to registered cultivating farmers. Payment flows to mills, and the distribution to farmers depends on mill practices and state-level FRP enforcement — not OMC procurement conditions.
- It does not require mills to publicly disclose the proportion of cane being diverted to ethanol vs. sugar production, leaving farmers unable to make informed planting and marketing decisions.
- It has no mechanism to reduce procurement volumes automatically when food security indicators — buffer stock levels, commodity price indices, monsoon performance — deteriorate below defined thresholds.
- It provides no consumer protection mechanism: no blend disclosure requirement at the pump, no compatibility advisory at vehicle service, no mileage compensation for owners of pre-2023 vehicles.

6.3 The EISS Subsidy Trail: Public Money, Concentrated Benefit

The Ethanol Interest Subvention Schemes authorised from 2018 to 2022 provided 6 percent per annum interest subvention (or 50 percent of the bank rate, whichever is lower) for 5 years, including

a 1-year moratorium, on loans for new distillery construction or expansion. The initial 2021 EISS approved ₹626 million (₹4,573 crore) covering 362 projects across 349 sugar mills and 13 standalone distilleries.

The Ministry of Food and Consumer Affairs' public list of EISS beneficiaries — available on the DFPD website — reveals the geographic and corporate concentration of these subsidies. Maharashtra, UP, and Karnataka account for the overwhelming majority of approved projects. The beneficiary list includes Shree Renuka Sugars, cooperative mills across Maharashtra's sugar belt, Kumbhi-Kasari Ssk Ltd, Vitthalrao Shinde Sahakari Sakhar Karkhana, and numerous other mill entities — all in states where political connections between the sugar industry and legislative representation are extensively documented in academic literature.

The EISS required recipients to supply at least 75 percent of their additional ethanol capacity to OMCs. This condition, while commercially sound from a programme delivery standpoint, also created a structural incentive for distilleries to maximise ethanol production at the expense of sugar — with no corresponding incentive to protect food security or water resources. Public subsidy was effectively being used to encourage maximum extraction of food crops for fuel.

7. The Political Economy of Ethanol: Who the Programme Was Actually Built For

This section examines the political economy of the E20 programme using publicly available data: Supreme Court-mandated electoral bond disclosures, published academic literature on the Maharashtra sugar-politics nexus, the geographic distribution of distillery licences and EISS beneficiaries, and the structural characteristics of the procurement system. This section does not make allegations without evidentiary basis. It presents documented facts, patterns from public record data, and structural arguments about governance design. Readers are invited to draw their own conclusions from the evidence presented.

7.1 The Electoral Bonds Framework: Foundational Context

On February 15, 2024, a five-judge constitutional bench of the Supreme Court of India unanimously struck down the Electoral Bonds Scheme, introduced by the BJP government in 2017, as unconstitutional. The court found it violative of the constitutional right to information and noted that it 'would lead to quid pro quo arrangements' between corporations and political parties. The court ordered the State Bank of India to disclose all bond purchase and redemption data to the Election Commission of India, which published it on March 15, 2024.

The disclosed data covers all bonds purchased and encashed between April 12, 2019 and January 24, 2024. It is a permanent public record, citable by name, date, and value. Key system-level findings from published analysis of this data:

- The BJP received approximately ₹6,060 crore (roughly USD $788 million) in electoral bonds — 47.46 percent of total system-wide donations;
- The top 10 individual donors all made substantial contributions to the BJP;
- Research published in Humanities and Social Sciences Communications (Nature, December 2025) documented four distinct patterns of corporate-political interaction in the bond data: political donations correlating with government contracts, enforcement actions preceding or following donations, donations from newly established companies, and coordinated multi-entity donor behaviour;
- The Stimson Center analysis found the BJP received nearly six times the Congress party's total, creating a structurally unequal funding environment.

LEGAL NOTE

This document does not assert that any specific electoral bond donation to any party constitutes an illegal act. The Supreme Court's own judgment noted the scheme 'fosters crony capitalism' as a structural risk — a finding about system design, not individual culpability. All citations here are from public records and published academic analysis.

7.2 The Sugar Industry and Electoral Finance: A Structural Pattern

The sugar industry — which is the primary beneficiary of the E20 programme's feedstock choices — is one of India's most politically organised industrial sectors. The relationship between sugar mill

ownership, legislative representation, and policy benefit has been documented in academic literature for decades, including in publications by the Economic & Political Weekly, the FUSE project at Stanford University, and peer-reviewed research on Maharashtra's cooperative political economy.

The structural argument, grounded entirely in public record, is as follows:

1. The administered price of ethanol — the single variable that most determines the industry's profitability — is set by the Cabinet Committee on Economic Affairs, chaired by the Prime Minister. The industry that benefits from this pricing is also, as documented in the electoral bond data, one of the largest political donors in the country during the same period.
2. The EISS subsidy allocation — public funds granted to specific entities for distillery construction — was administered discretionarily by the Ministry of Food and Consumer Affairs. The geographic concentration of awards in states with BJP governments (UP and, during specific periods, Maharashtra and Karnataka) is evident from the public beneficiary list.
3. The 2021 feedstock reversal — the most consequential single policy decision for the sugar and grain industries — was made within an inter-ministerial committee process that has not published its deliberative record. The Indian Sugar Mills Association (ISMA) and state-level sugar industry associations are documented as having made representations to this process.
4. The Long-Term Offtake Agreements between OMCs and distilleries — negotiated with government-administered pricing — lock in a guaranteed revenue stream for a 5–15 year period. These agreements function as government-backed commercial anchors for the mill-distillery sector, whose investment value is directly linked to the continuation and expansion of the blending mandate.

7.3 Maharashtra: The Clearest Documented Case

Maharashtra's sugar cooperative sector is the most thoroughly studied case of industry-politics integration in Indian scholarship. The state produces the highest amount of sugarcane after Uttar Pradesh and leads in ethanol production capacity at 396 crore litres per year as of June 2025.

The historical pattern, documented in The Caravan's 2019 investigation and confirmed by subsequent reporting in The Wire (April 2025), is as follows: Maharashtra's cooperative sugar mills were historically controlled by politicians affiliated with the Congress and NCP. These politicians deployed cooperative membership networks for election campaigning while directing state loan guarantees, input subsidies, and regulatory exemptions toward their mills. As the BJP consolidated political dominance in Maharashtra — through the 2019 elections and subsequent alliance shifts — many sugar cooperative leaders migrated their political affiliations, or were politically displaced from mill leadership positions when the BJP declined to guarantee loans to opposition-affiliated cooperatives.

The ethanol programme created a new revenue stream for these mills at a critical juncture. Maharashtra's multi-feed distillery policy — enabling mills to switch between feedstocks without separate licensing — was notified by the state government on July 23, 2025. The public commentary around this policy, as reported by ChiniMandi, explicitly credits the efforts of 'policy makers, cooperative leaders, private sugar industrialists, technocrats, and farmers who tirelessly advocated

for this reform.' The advocates are not named publicly. The beneficiaries are the mill-distillery complexes whose leadership has navigated the state's political transitions.

A high-level meeting on cooperative sugar mill policy convened in March 2026 at Sugar Bhavan, Mumbai — chaired by Maharashtra's Cooperation Minister — included sitting MLAs, former ministers, and cooperative bank leadership. The sugar commissionerate, when questioned by The Wire, declined to exercise regulatory authority over sugarcane cultivation patterns, stating that farmers' crop choices are autonomous. The central pollution control board is cited for environmental enforcement — despite documented river pollution incidents near distilleries. The structure that emerges is one in which the people who make the rules are the same people who benefit from the absence of rules.

7.4 Uttar Pradesh: Scale, Concentration, and State Sponsorship

Uttar Pradesh has been governed by the BJP under Chief Minister Yogi Adityanath since 2017 — the period of the programme's most intense scaling. Ethanol expansion has been presented as a flagship achievement of the UP government and the Modi-led central government, with press conferences, farmer outreach events, and media campaigns built around the blending milestone.

The state's distillery landscape is dominated by a handful of large corporate groups:

- Bajaj Hindusthan Sugar Limited (BHSL): India's largest sugar and ethanol manufacturer. 14 sugar plants and 6 distilleries, exclusively in UP. 136,000 TCD crushing capacity; 800 KLPD distillation capacity. All plants in the sugarcane belt districts of Lakhimpur Kheri, Pilibhit, Meerut, Saharanpur, and Muzaffarnagar. The company has had promoter holding pledged to 100% of shares — a sign of financial leverage — yet has received EISS benefits during this period and supplies ethanol to OMCs under long-term agreements.
- Triveni Engineering and Industries Limited: 7 sugar mills and 7 co-located distilleries in UP. Ethanol capacity of 860 KLPD. Works with over 3 lakh sugarcane farmers. Supplied over 155 million litres of ethanol in FY 2024–25.
- Dhampur Sugar Mills, Dwarikesh Sugar Industries, Balrampur Chini Mills: Further major corporate producers, all located in the UP sugarcane belt, all major OMC ethanol suppliers.

The UP Distillers Association (UPDA) — the apex body of UP's distillery industry — describes itself as an 'active participant in the UP Liquor Growth story through its Advocacy Role for the Policy Makers and Regulators of the State & Central level.' It has 85 member distilleries with 20 more forthcoming. The UPDA's own documentation acknowledges its role as an interface between industry and government at both state and central levels — a publicly stated lobbying function operating within a state whose government has made ethanol expansion a headline achievement.

7.5 The Structural Capture Argument

The most powerful argument in this section does not require naming individuals or asserting corrupt intent. It emerges from the design characteristics of the procurement system itself:

- Ethanol prices are set by the government → creating a direct line between political decisions and industry profitability for a politically organised sector.

- Distillery licences are granted at the state level → where ruling party relationships with local industrialists are most proximate.
- EISS subsidies are administered discretionarily → not by competitive tender, but by government approval, with concentration in specific geographies.
- The primary beneficiary class of the 2021 feedstock reversal — large 1G mill-distillery complexes — has demonstrably greater political organisation and financial resources than the 2G technology developers who would have benefited from the original pathway.
- Consumer costs are diffuse, unorganised, and invisible — mileage loss, food price inflation — while industry benefits are concentrated, politically organised, and loudly amplified.
- The government has not released independent test data on engine performance; has not created a compensation mechanism for pre-2023 vehicle owners; has not restored E10 availability; has not mandated blend disclosure at pumps — all of which would benefit consumers at some cost to programme momentum.

A programme with these design characteristics does not require conspiracy. It runs on structural incentive alignment between a politically organised beneficiary class, a government committed to a target for which that class is the primary supplier, and a population of cost-bearers who are diffuse, unorganised, and unconsulted.

8. The Legislative Gap: What Laws India Needs

8.1 Current Legal Framework — What Exists and Its Limits

India's ethanol programme operates without a single piece of primary legislation specifically governing its food security, water, or farmer protection dimensions. The National Policy on Biofuels (2018, amended 2022) is a policy document — it provides direction but imposes no enforceable obligations. The existing legislative instruments that touch the programme are:

- Essential Commodities Act (ECA): Can theoretically restrict commodity diversion but has not been systematically applied to ethanol feedstocks;
- Water (Prevention and Control of Pollution) Act 1974: Governs distillery effluent but enforcement is inconsistent and state-level;
- Industries (Development & Regulation) Act: Amended only to ease ethanol movement, not to regulate production standards;
- Sugarcane (Control) Order 1966: Governs cane pricing but not diversion proportions;
- Food Safety and Standards Act 2006: Does not address food-fuel competition scenarios.

The gap is not merely technical. It reflects a governance design in which the ethanol programme was constituted as an energy policy administered by petroleum and food ministries — rather than as a food and water policy that produces energy as a secondary output. That inversion of priority is written into the absence of protective legislation.

8.2 Proposed Legislative Instruments

Proposed Instrument	What It Does	Gap It Closes	Priority
Crop Diversion Cap Law	Statutory annual limits on crop diversion per feedstock, auto-trigger in drought years	No current cap on food crops used for ethanol	**IMMEDIATE**
Water Budget Mandate for Distilleries	Bar new licences in CGWB Overexploited blocks; mandatory water recycling; regional surcharge funding recharge	No water-use condition in any distillery licensing	**IMMEDIATE**
Strategic Food Reserve Protection Act	Legal floor for FCI stocks below which no grain released for ethanol; Parliament notification for any release	FCI grain treated as industrial feedstock without statutory food-first protection	**IMMEDIATE**
Farmer Protection & Transparency Act	Direct payment to cultivating farmers; mill disclosure of cane-to-ethanol diversion ratio;	No mandatory pass-through of ethanol premium to actual farmers	**SHORT-TERM**

Proposed Instrument	What It Does	Gap It Closes	Priority
	smallholder premium floor		
Flex-Fuel Vehicle (FFV) Mandate	All new passenger vehicles and two-wheelers required to be FFV-capable from 2028; dual-fuel retail infrastructure	E20 mandate imposed on non-compliant fleet without consumer protection	**SHORT-TERM**
Integrated Biofuel Governance Authority	Statutory body with food, water, agriculture, environment, consumer reps; power to pause blending targets if thresholds breached	No single accountable body; fragmented across 5+ ministries	**MEDIUM-TERM**
Consumer Disclosure & Transparency Law	Legal requirement: blend % displayed at pump; vehicle compatibility certificate at sale and service	Consumers have no legal right to blend information	**IMMEDIATE**

Note: All proposed instruments are based on analysis of existing governance gaps and comparative international practice. They represent the author's assessment of what a responsible legislative framework would include.

8.3 Key Legislative Principles

Beyond specific instruments, the legislative framework should be governed by three overarching principles:

Food-First Trigger

Any legislation must contain an automatic food-first trigger mechanism: a defined set of conditions — production shortfalls, buffer stock depletion below norms, commodity price index breach, monsoon failure — under which ethanol blending targets are automatically reduced or paused without requiring political decision. The current system requires executive action to cap diversion, making it vulnerable to political inertia when the ethanol industry lobby resists reduction.

Water-First Siting Principle

No new ethanol production capacity — whether through new distillery construction or expansion — should be permissible in CGWB-classified Critical or Overexploited groundwater assessment units. This is not a restriction on production growth; it is a redirection of growth to where water can sustain it. The substantial untapped capacity in less-stressed regions and the potential of 2G feedstocks provide ample room for programme expansion outside stress zones.

Accountability and Transparency Standard

All government subsidies to the ethanol sector — EISS disbursements, administered price settings, LTOA terms — should be published in real-time on a unified public registry, cross-referenced with

corporate ownership disclosure, water use compliance records, and food security indicators. This is the minimum standard for a programme that uses public money, public food grain, and public groundwater to produce private profit.

9. What Blending Percentage is Actually Sustainable?

9.1 Defining Sustainability

A sustainable blending level, for the purposes of this document, must satisfy all of the following simultaneously: it does not materially threaten food security or raise food prices for the most vulnerable income deciles; it operates within the water-bearing capacity of producing regions; it is achievable without mandating a vehicle fleet transition that imposes uncompensated costs on consumers; it achieves net positive carbon and energy balances across its full production lifecycle; and it is financially viable for OMCs without structural subsidy dependence.

9.2 The Sustainability Scoring Matrix

Blend	Production Feasibility	Food Security Stress	Water Risk	Fleet Readiness	Social Acceptance	Score /10
E10	✓ Achieved	LOW	Moderate	~100%	High	**9/10**
E15	✓ Achievable	LOW-MODERATE	Moderate-High	~60%	Moderate	**7/10**
E20 (current)	✓ Achieved	MODERATE-HIGH	**HIGH**	~10–15%*	LOW (66% dissatisfied)	**5/10**
E22	Possible (surplus capacity exists)	**HIGH**	HIGH	~10–15%	VERY LOW	**4/10**
E27–E30	Conditional (requires 2G + FFV)	**CRITICAL**	**CRITICAL**	<5% (flex-fuel only)	VERY LOW	**2/10**

**Fleet readiness as of 2025–26: only vehicles manufactured from April 2023 are E20-compliant; approximately 90% of the existing fleet was rated for E10 or below. Sources: SIAM, LocalCircles survey (36,000 respondents, Aug 2025), ARAI, Ministry of Petroleum statements. Scores are the author's indicative assessment based on multi-variable analysis.*

9.3 The Evidence-Based Sustainable Range

Near-Term (2026–2028): 12–15 Percent

Under current 1G feedstock composition and fleet structure, the market can genuinely absorb 12–15 percent blending without systemic stress. This corresponds to a managed E20 rollout that maintains E10 availability for the 90 percent of the fleet not yet compliant, rather than imposing a mandatory single-blend nationwide system.

Medium-Term (2028–2032): 18–20 Percent with Structural Reform

E18–E20 becomes sustainably maintainable if: the vehicle fleet has turned over substantially toward E20-compliant models through FFV mandates; 2G ethanol from agri-waste contributes at least 25

percent of total supply; and clear food-first statutory triggers are in place. This is achievable but requires genuine structural reform — not simply more distillery capacity.

E27–E30 (Post-2030): High Risk Without Transformation

The stated target of E27–E30 by 2030 is incompatible with food and water security under the current 1G feedstock and fleet structure. Achieving it sustainably requires: a mandate for all new vehicles to be flex-fuel capable; a switch to predominantly 2G and 3G feedstocks; formal integration of the programme with food and water policy; and sugar export policy delinked from ethanol mandates. Without these prerequisites, the push to E30 would require diverting food crops, depleting aquifers, and imposing vehicle compatibility costs at a scale that makes the current E10-to-E20 transition appear modest by comparison.

9.4 The Brazil Comparison — What It Actually Shows

Brazil is consistently cited as the model for India's ethanol programme. What that comparison actually shows is instructive: Brazil operates E27 fuel as a mandatory standard and has over 80 percent of its light vehicle fleet running on flex-fuel engines. This outcome required three decades of consistent policy, purpose-built FFV manufacturing mandates, and a sugarcane-to-ethanol conversion efficiency roughly 40 percent higher than India's. Brazil's ethanol programme also originated in a political-economic context of energy import crisis and military government — conditions that allowed rapid, coercive transition that democratic India cannot and should not replicate.

India's attempt to compress a 30-year transition into 4 years, without flex-fuel mandates, without dual-fuel retail infrastructure, without 2G deployment, and without food-first statutory protection, is historically unprecedented. The Brazil comparison justifies the destination. It does not justify the speed or the pathway.

10. Recommendations

10.1 Immediate Actions (Within 2026)

5. Restore E10 fuel availability at a meaningful proportion (minimum 30 percent) of pumps alongside E20, providing consumer optionality for pre-2023 vehicles;
6. Mandate blend percentage disclosure at every petrol pump — a basic consumer protection measure with no technical barrier to implementation;
7. Enact the Strategic Food Reserve Protection Act by ordinance if necessary, establishing a legal floor for FCI stocks below which no grain is released for ethanol;
8. Publish a full, independently verified engine and materials compatibility report from ARAI and release it publicly — the data demanded by consumers and denied since August 2025;
9. Institute an emergency moratorium on new distillery licences in CGWB-classified Overexploited blocks pending water budget legislation;
10. Reduce maize diversion for ethanol by 50 percent for ESY 2025–26 to allow domestic feed supply to stabilise and poultry prices to moderate.

10.2 Short-Term Reforms (2027–2028)

11. Introduce the Crop Diversion Cap Law with automatic food-first triggers keyed to buffer stock levels, commodity price indices, and monsoon performance;
12. Enact the Water Budget Mandate for Distilleries, conditioning both EISS eligibility and OMC procurement on water use compliance in the district of operation;
13. Mandate flex-fuel vehicle capability for all new passenger cars and two-wheelers manufactured after April 2028, phasing out the one-size-fits-all blending approach;
14. Scale 2G ethanol production to at least 20 percent of total supply by 2029 — requiring dedicated PM-JI-VAN Yojana disbursements and technology transfer through the Global Biofuel Alliance; the current 2G contribution below 1 percent after four years of the programme is a failure the government has not publicly acknowledged;
15. Enact the Farmer Protection and Transparency Act, requiring mills to disclose cane-to-ethanol diversion ratios and mandating direct payment of the ethanol premium proportion to registered cultivating farmers.

10.3 Long-Term Structural Reform (2028–2032)

16. Establish the Integrated Biofuel Governance Authority as a statutory multi-ministry body with independent technical board representation from food security, water, agriculture, environment, and consumer welfare sectors;
17. Develop a dual-rail retail market: E20 as the standard blend for the transitioning fleet, E85 as the premium for flex-fuel vehicles, supported by dedicated infrastructure;
18. Integrate the ethanol programme formally into India's National Water Policy and National Food Security architecture — not as an energy programme that happens to use food and water, but as an agricultural programme that produces energy;
19. Establish a national ethanol subsidy transparency registry — all EISS disbursements, LTOA terms, OMC procurement contracts, and water compliance records published in real-time with corporate ownership cross-referencing;
20. Commission an independent, externally peer-reviewed lifecycle analysis of the full social, ecological, and economic cost of the E20 programme — not a government agency self-

assessment, but a credible independent study of the kind India's policy community has never produced for this programme.

11. Conclusion

India's E20 achievement is a story of extraordinary administrative ambition and execution. The ability to more than triple ethanol blending in four years, build a new industrial sector, and achieve a target five years ahead of schedule is a genuine demonstration of what coordinated state action can accomplish. These facts should not be dismissed.

But facts must be told whole. The same programme that achieved E20 ahead of schedule also made India a net importer of maize for the first time in decades. The same programme that saved ₹1.06 trillion in forex expenditure also converted 5.2 million tonnes of strategic food grain into fuel. The same programme that transferred income to sugarcane farmers in five states raised egg and poultry prices for 1.4 billion consumers. The same programme that is celebrated as an environmental achievement is drawing groundwater from Punjab and Haryana aquifers — aquifers that have lost 64.6 BCM over 17 years and are not being recharged.

A programme that costs the food-insecure to subsidise the energy-secure is not a clean energy programme. It is a wealth transfer with environmental messaging.

The path to a genuinely sustainable biofuel future for India exists. It runs through second-generation cellulosic ethanol that turns crop residue into fuel without touching food supply. It runs through flex-fuel vehicles that give consumers choice rather than imposing a single blend on a heterogeneous fleet. It runs through statutory food-first triggers that make the programme retreat when food security is threatened. It runs through legislation that protects water tables and smallholder farmers rather than concentrating subsidy benefit in large mill-distillery complexes with political connections.

That path requires dismantling the structural capture that has shaped the current programme. It requires a government willing to put the interests of the 1.4 billion before the interests of the 499 distilleries. It requires citizens, civil society, journalists, and legislators to read the evidence — all of it — and to demand accountability for a programme conducted, as all government programmes must be, in the public's name.

This document is offered as a contribution to that reading.

References and Sources

All sources cited in this document are publicly available. Readers are encouraged to verify every claim independently.

Government and Official Sources

- Ministry of Petroleum and Natural Gas (MoPNG), Government of India. Press releases on ethanol blending data 2022–2026. pib.gov.in
- Ministry of Consumer Affairs, Food and Public Distribution (DFPD). EISS Beneficiary List. dfpd.gov.in/WriteReadData/Other/annexure-dir-sug-I.pdf
- Ministry of Consumer Affairs. FCI Rice Allocation for Ethanol ESY 2024–25. Official communication, 2025.
- Central Ground Water Board (CGWB). National Compilation on Dynamic Ground Water Resources of India 2023. Published June 2024.
- NITI Aayog / MoPNG. Roadmap for Ethanol Blending in India 2020–25. June 2021.
- Rajya Sabha, Parliament of India. Statement of Minister of State for Petroleum and Natural Gas on E20 fuel efficiency. March 17, 2025.
- Election Commission of India. Electoral Bond Data Disclosure. March 15–17, 2024. eci.gov.in
- APEDA. Maize Export Data 2024–25. apeda.gov.in
- Food Corporation of India. Stock data. fci.gov.in

United States Department of Agriculture (USDA) — GAIN Reports

- FAS USDA New Delhi. 'Biofuels Annual — India.' IN2024-0024. July 2024.
- FAS USDA New Delhi. 'Sugar Semi-Annual — India.' IN2024-0045. 2024.
- FAS USDA New Delhi. 'Sugar Annual — India.' IN2025-0027. 2025.
- FAS USDA New Delhi. 'Grain and Feed Annual — India.' IN2025-0023. 2025.
- FAS USDA New Delhi. 'India — Food Price Inflation in 2022.' IN2022-0061.
- FAS USDA New Delhi. 'India Restricts Sugar Exports Beyond October 31 for Indefinite Period.' IN2023-0083.

Research and Academic Sources

- Mittal, A. & Singh, R. (2024). 'Behind the Curtain: Unravelling Corruption in the Electoral Bonds Scheme.' Humanities and Social Sciences Communications (Nature). December 2025.
- Anjal Prakash et al. 'Navigating India's Groundwater Crisis: Legal and Institutional Perspectives.' Water Policy Journal, IWA Publishing. August 2024.
- Lalvani, M. 'Sugar Co-operatives in Maharashtra: A Political Economy Perspective.' ResearchGate. 2008.
- FUSE Project, Stanford University. 'Political Economy of Sugar Cooperatives in Maharashtra.' fuse.stanford.edu
- SPRF India. Chauhan, N. 'Grain-Based Ethanol: Feasibility and Sustainability Considerations.' January 2024.

- Ideas for India. 'Why India's Plan to Sell Rice for Ethanol Undermines Food and Water Security.' 2025. ideasforindia.in
- Observer Research Foundation. 'Ethanol Blended Petrol for Energy Security: India's Self-Goal?' October 2024. orfonline.org
- CSTEP (Centre for Study of Science, Technology and Policy). 'Trade-offs in Ethanol-Based Biofuel Expansion.' Policy Brief. December 2024.
- Stimson Center. 'India's Electoral Bond Conundrum.' stimson.org. 2024.

Media Investigations and Reports

- Down To Earth. 'Lost in Maize — India's Maize Dilemma: Ethanol Production Sparks Import Surge.' June 2025. downtoearth.org
- Down To Earth. 'Centre Approves Additional 2.8 MT of FCI Rice for Ethanol Production.' May 2025.
- Down To Earth. 'India's Ambitious Push for 27% Ethanol Blending: A Step Toward Energy Security or a Risky Bet?' August 2025.
- Business Standard. 'Ethanol Push Turns India into Corn Importer, Shaking Up Global Market.' September 4, 2024.
- Mongabay India. 'From Policy to Pushback: India's Greenlash over Ethanol-Blended Petrol.' September 2025.
- The Wire. 'How Sugarcane Determines the Politics of Maharashtra.' April 2025.
- The Caravan. 'Sugar Barons Back the BJP, Weaken the Congress-NCP Hold on Western Maharashtra.' October 2019.
- The Federal. 'Will Ethanol-Blended Fuel Ruin Your Engine? India's Ethanol Push Explained.' August 2025.
- The Logical Indian. 'India's Rapid E20 Petrol Rollout Highlights Green Push and Vehicle Compatibility Concerns.' August 2025.
- Al Jazeera. 'India's Electoral Bonds Laundry: Corrupt Firms Paid Parties, Got Cleansed.' April 2024.
- BusinessToday. 'Ethanol Blending May Change Soon: Here's How the Shift Beyond E20 Will Happen.' April 22, 2026.
- CarToq. 'Sugar Lobby Pushing for E22 Ethanol Petrol Blending.' April 2026.
- LocalCircles Survey. Consumer Satisfaction with E20 Rollout. 36,000 respondents. August 2025.
- Maize Outlook, October 2024. Agricultural Market Intelligence Centre, PJTAU. pjtau.edu.in

Industry Data Sources

- ChiniMandi. State-wise Ethanol Distillery Capacity Data ESY 2024–25. August 2025. chinimandi.com
- Bajaj Hindusthan Sugar Ltd. Company Profile and Plant Details. bajajhindusthan.com
- Shree Renuka Sugars Ltd. Company Profile. renukasugars.com
- Triveni Engineering and Industries Ltd. Annual Report 2024–25.
- Screener.in. Bajaj Hindusthan Sugar Ltd — Financial Data.
- UP Distillers Association (UPDA). updaindia.com

Disclaimer

This document has been prepared for public benefit and awareness. It does not constitute legal advice. All assertions are grounded in publicly available information as of April 2026. The author acknowledges that some data — particularly in the political economy section — is from secondary sources analysing primary public records. Readers with access to additional primary records are encouraged to conduct further verification and contribute to the public record. No statements in this document are intended to defame any individual or organisation. Documented patterns of systemic behaviour are distinguished throughout from allegations of individual wrongdoing.